

WE CLAIM:

1. A method, comprising:
moving a series of pallets in a process direction, wherein the pallets in the
5 series of pallets each are oriented substantially vertically with leading and trailing
major surfaces extending substantially transverse to the process direction;
tipping a pallet in the series of pallets in a forward rotational direction to
expose the trailing major surface of the pallet;
blocking the motion of an upper portion of the pallet in the forward rotational
10 direction with a pallet restraining device; and
moving a lower portion of the pallet while the upper portion of the pallet is
blocked by the pallet restraining device, such that the pallet tips in a rearward
rotational direction and becomes oriented substantially horizontally with its leading
major surface facing substantially upward and its trailing major surface facing
15 substantially downward.
2. The method of claim 1, wherein the pallet restraining device
comprises an arm and blocking the motion of the upper portion of the pallet
comprises at least partially absorbing a force of impact between the arm and the
20 upper portion of the pallet by pivoting the arm.
3. The method of claim 1, wherein moving the lower portion of the
pallet comprises engaging a leading edge of a lower end of the pallet with a
conveyor, such that the pallet becomes oriented substantially horizontally on the
25 conveyor after tipping in the rearward rotational direction, and further comprising
moving the pallet in the process direction with the conveyor.
4. The method of claim 1, wherein the pallet is a first pallet, the pallet
restraining device is a second pallet restraining device, further comprising a first
30 pallet restraining device spaced rearwardly of the second pallet restraining device in
the process direction, the method further comprising:

resisting movement of the first pallet in the process direction with the first pallet restraining device before tipping the first pallet in the forward rotational direction, wherein the first pallet restraining device comprises an arm with a lower end;

5 moving the first pallet in the process direction by allowing the arm to pivot; dropping the first pallet from a first level to a second level lower than the first level, such that the upper portion of the first pallet is positioned below the lower end of the arm; and

10 pivoting the arm to resist the movement of a second pallet in the series of pallets.

5. The method of claim 4, wherein the first pallet has a lower end with a leading edge and a trailing edge and dropping the first pallet comprises dropping the first pallet onto an obstruction or an inclined surface, such that downward movement
15 of the trailing edge is blocked before downward movement of the leading edge is blocked.

6. The method of claim 5, wherein the leading edge contacts a conveyor as the first pallet tips in the forward rotational direction.
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7. The method of claim 1, wherein the pallet is a first pallet and further comprising:
tipping a second pallet in the series of pallets in a forward rotational direction to expose the trailing major surface of the second pallet; and
25 releasing the pallet restraining device to allow the second pallet to continue tipping in the forward rotational direction, such that the second pallet becomes oriented substantially horizontally with its leading major surface facing substantially downward and its trailing major surface facing substantially upward.

8. The method of claim 7, further comprising blocking the motion of an upper portion of the second pallet in the forward rotational direction with the pallet restraining device before releasing the pallet restraining device.
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9. The method of claim 7, wherein the pallet restraining device comprises an arm and releasing the pallet restraining device comprises pivoting the arm.

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10. The method of claim 9, wherein pivoting the arm comprises increasing the force exerted by the second pallet on the arm in the forward rotational direction.

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11. A pallet handling system, comprising:
a pallet restraining device for blocking the motion of an upper portion of a pallet after the pallet has tipped in a forward rotational direction away from an upright position; and
a conveyor for moving a lower portion of the pallet while the upper portion of the pallet is blocked by the pallet restraining device, wherein moving the lower portion of the pallet with the conveyor while the upper portion of the pallet is blocked by the pallet restraining device causes the pallet to tip in a rearward rotational direction and eventually contact the conveyor in a substantially horizontal position.

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12. The pallet handling system of claim 11, wherein the pallet restraining device is configured to unblock the upper portion of the pallet in response to intervention by an operator, such that the pallet continues to tip in the forward rotational direction.

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13. The pallet handling system of claim 11, wherein the conveyor is a first conveyor and further comprising a curved, second conveyor positioned downstream from the first conveyor in a process direction.

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14. The pallet handling system of claim 11, wherein the pallet restraining device comprises a pivoting arm configured to block the motion of the upper portion of the pallet as the pallet tips in the forward rotational direction.

15. The pallet handling system of claim 14, wherein the pallet restraining device further comprises a counterweight to resist movement of the pivoting arm.

5 16. The pallet handling system of claim 14, wherein the pallet restraining device further comprises an adjustment device for adjusting the angle of the pivoting arm.

10 17. The pallet handling system of claim 14, wherein the pallet restraining device further comprises an actuator for moving the pivoting arm.

15 18. The pallet handling system of claim 14, wherein the pivoting arm is configured to pivot to at least partially absorb a force of impact between the pivoting arm and the upper portion of the pallet.

19. The pallet handling system of claim 14, wherein the pivoting arm is configured to pivot enough to unblock the upper portion of the pallet in response to intervention by an operator, so as to allow the pallet to continue to tip in the forward rotational direction.

20 20. The pallet handling system of claim 11, wherein the pallet is a first pallet in a series of substantially vertically oriented pallets, the pallet restraining device is a second pallet restraining device spaced forwardly from a first pallet restraining device in a process direction, the first pallet restraining device is operable
25 to control the movement of pallets in the series of substantially vertically oriented pallets, and further comprising a pallet feeding device for moving the series of substantially vertically oriented pallets in the process direction.

30 21. The pallet handling system of claim 20, further comprising an incline or obstruction at the receiving surface configured to cause the first pallet to tip in the forward rotational direction after landing on the receiving surface.

22. The pallet handling system of claim 20, wherein the first pallet
restraining device comprises a pivoting arm configured to allow the first pallet to
move in the process direction and to restrain movement of a second pallet in the
series of substantially vertically oriented pallets by engaging an upper portion of the
5 second pallet.

23. The pallet handling system of claim 22, wherein the pivoting arm has
a lower end, the pallet feeding device further comprises a support surface, the pallet
handling system further comprises a receiving surface positioned below the support
10 surface, and the pallet handling system is configured to drop the first pallet from the
support surface to the receiving surface, thereby positioning the upper portion of the
first pallet below the lower end of the pivoting arm and allowing the first pallet to tip
in the forward rotational direction without being obstructed by the pivoting arm.

15 24. A pallet handling system, comprising:
a pallet feeding device for moving a series of substantially vertically oriented
pallets in a process direction, the pallet feeding device comprising a support surface
and a first pallet restraining device, the first pallet restraining device having a first
pivoting arm with a lower end;
20 a receiving surface positioned below the support surface, the receiving
surface configured to receive a first pallet in the series of substantially vertically
oriented pallets dropped from the support surface, thereby positioning an upper
portion of the first pallet below the lower end of the first pivoting arm;
an incline or obstruction on the receiving surface configured to cause the first
25 pallet to tip in a forward rotational direction after landing on the receiving surface;
a second pallet restraining device spaced forwardly of the first pallet
restraining device in the process direction and comprising a second pivoting arm, the
second pallet restraining device blocking the motion of the upper portion of the first
pallet as it tips in the forward rotational direction; and
30 a conveyor for moving a lower portion of the first pallet while the upper
portion of the first pallet is blocked by the second pallet restraining device, wherein
moving the lower portion of the first pallet with the conveyor while the upper

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portion of the first pallet is blocked by the second pallet restraining device causes the first pallet to tip in a rearward rotational direction and land on the conveyor in a substantially horizontal position.